Bradshaw Lecture for 1893

SIR ASTLEY COOPER AND HIS SURGICAL WORK

DELIVERED BEFORE THE ROYAL COLLEGE OF SURGEONS

DECEMBER 7, 1893

BY

SIR WILLIAM MAC CORMAC

VICE-PRESIDENT OF THE COLLEGE AND CHAIRMAN OF THE COURT OF EXAMINERS; CONSULTING SURGEON, AND EMERITUS LECTURER ON CLINICAL SURGERY AT ST. THOMAS'S HOSPITAL

Hon. Corresponding Member of the French Academy of Medicine; Hon. Member of the Royal Academy of Medicine, Rome, and Royal Medical Society, Sweden; Hon. Fellow of the Medical Society of Munich, and American Surgical Association; Officier de la Légion d'Honneur, Chevalier North Star of Sweden, and Sao Thiago of Portugal; Ritterkreuz (1st class) Bavaria; Kron Orden of Germany (4th class); Medjidieh (3rd class); Knight Commander of the Order of the Takovo and of the Dannebrog (1st class), and Commander of the Crown of Italy

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Mr. President and Gentlemen,

To Mrs. Bradshaw, who survived her husband some fourteen years, we owe the foundation of this annual lecture in honour of her husband's name.

The President of each College nominates the Lecturers for the year at his discretion and in this College the selection of a subject for the Lecture, provided only a surgical one be chosen, is otherwise free from restriction.

The choice is always difficult, and in making one from the field of Surgery, it has occurred to me that some account of the life and labours of one of the great Surgeons of a bygone period, and the relation of his work to the Surgery of to-day might not be uninteresting.

Cooper.—More than fifty years have passed since Sir Astley Cooper completed the allotted term of his active and honourable career.

It cannot be out of place to review in this lecture theatre the life of a man who was twice President of this College, who has enriched its great Museum by so many valuable and instructive specimens, and who founded the important Triennial Astley Cooper prize; moreover, as a lecturer on Surgery at St. Thomas's Hospital, and as

Surgeon to Guy's Hospital his career must have a still closer interest for many here present to-day.

Sir Astley Cooper was essentially an observer, and a patient recorder of what he observed. How difficult all complete observation is may be exemplified from the records of any science. In the exact sciences error can be made to correct itself, but in the study of the ever-changing conditions of animal life, both in health and disease, where so much must be left to conjecture, fallacies are prone to creep in, and despite the resources of the post-mortem room and the multitude of illustrations of disease our great museums possess, the truth often eludes our search. If this be so in the present day, how great must have been the difficulties under which the surgeon of seventy or eighty years ago was fain to strive after success, and his difficulties of achievement were no less serious.

In contrasting the Surgery of the past with that of our own time, one may fitly dwell upon the fact that nearly the whole of the most recent developments of Surgery depend for their possibility upon the command of means for annulling pain, and for their success upon the practical recognition of the value of perfect purity, and of the exclusion from all wounds of the mischief-working germs that once tracked the Surgeon's knife like an avenging spirit, and wrecked the best labours of his hand and brain. These great factors were practically non-existent in Cooper's day, and it is not easy for us to realise the conditions under which he won his triumphs, our path to great results being now so smooth. Anæsthesia, local or general, has now freed our craft of its former horrors, and has given an almost unlimited scope to our undertakings. Antiseptic and aseptic systems everywhere prevail, and are daily bringing the treatment of surgical and traumatic wounds nearer to the goal of absolute scientific precision. We may

well be proud that it is from the English-speaking race that both these inestimable advantages have sprung, and that their value has been recognised in all civilised communities.

The principles of antiseptic surgery are now adopted in every country. In the great hospitals of Paris the younger generation of French Surgeons carry out the aseptic principle with a confidence and a perfection of detail that are unsurpassed, if they be equalled, by anything at home. But their origin is generously acknowledged. In a recent report to the French Academy on Sir Joseph Lister's claims to election to that body, Professor Charcot, of whose brilliant genius the hand of death has so recently deprived us, ascribes "the powerful impulse which surgical procedures have received, and the absolute security with which they may be practised to the beneficent revolution initiated by Lister, and affirms that Surgery which has become all-powerful since the great reform, is in astonishing contrast to the hesitating and comparatively unscientific methods of former times. Operations have assumed a character of precision and a certainty of result truly unhoped for, and inspired as they are by a scientific foundation they have been definitively rescued from empiricism." At the scientific centres of work found in every German University town, the most scrupulous adherence to the principles of asepticism everywhere prevails. In Italy, where medical science is advancing so rapidly, the same methods have been adopted. In America our surgical brethren are as devoted believers in the soundness of the practice as any of us in the Old World, and the new Surgery is nowhere more ardently or more successfully pursued.

All honour then should be given to the man who has devoted his life to developing a principle and perfecting a

practice which has so incalculably benefited mankind. What testimony can be greater or more remarkable than that afforded by the immense advance of surgical practice which his teaching has effected throughout the world, and by the gratitude of tens of thousands of our fellows, whom it has enabled us to restore to physical soundness.

In the latter part of the last century the condition of our art was very different from what it is now, but still we had an English School, led by Percival Pott and John Hunter, of which we were justly proud; France, too, boasted of men of giant mould, and both Italy and Germany were shaking off the empiricism which had so long degraded the name of Surgery. The early education of Cooper began in England, but the leaders of the French School gave invaluable aid to the development of the faculties which our great Surgeon was destined to apply so nobly for the benefit of his own age and of posterity.

Desault.—For Desault especially he had a great and sympathetic admiration. Desault was one of the fathers of what we may term "Surgical Anatomy," that is, the special teaching of anatomical facts in their practical applications to Surgery, and his work has made a lasting impression on surgical practice. It was he, too, who re-established the method of immediate ligature of the arteries, forgotten in France since the time of Ambrose Paré. Dupuytren, Lisfranc, and Delpech, men of no less power, contributed in varying degrees to the formation of Cooper's character.

Dieffenbach.—In Berlin during the same period Dieffenbach's labours in perfecting Plastic and Subcutaneous Surgery were helping to create a new era. The name of Dieffenbach is interwoven with the history of German Surgery as one of its greatest exponents. He sought

earnestly to simplify his art and rid it of the heavy harness with which the instrument-maker had overloaded it, and of the complicated methods that sadly hindered its progress. His treatise on Operative Surgery is a German classic, and his work on the division of muscles and tendons may be called epoch making. As an operator, he is said to have executed wonders with a scalpel and a few pins, in the restoration of lost or deformed parts of the body, but his manual dexterity, extraordinary though it was, may be regarded as one of the least of his many great qualities.

He died in the operating theatre, surrounded by a crowd of pupils who were earnestly watching the completion of his operation. The master hand fell, overtaken by death, just as its work was done, but clung still to the knife that had achieved so many good deeds. It was a fitting and a glorious end for such a man, to fall like a soldier on the field, his last victory won.

Scarpa.—In Italy the chief contemporary Surgeon was Scarpa, to whose works we meet frequent reference in Cooper's treatise on Hernia. Like Cooper he became a Professor at an early age, and his lectures attracted universal admiration by their eloquence, lucidity of expression and purity of language, as well as by the rare beauty of the preparations by which they were illustrated. Scarpa, although an Italian, owed something of his power to England, for he had been a pupil of Pott, and of John and William Hunter, and this training was reflected in his classical monographs on hernia, clubfoot, and aneurism. The beautiful plates which illustrate his works attest his skill as a draughtsman; and as an anatomist his name is still a household word for every student of medicine.

Hunter.—Of John Hunter I need not speak in this hall, where so many eloquent tributes have already been paid to his memory, except to show how far his genius

directed the career of young Astley Cooper. Hunter believed that Nature herself must be interrogated, and that experience and experiment alone should form the true basis for Surgery. Armed with a wide knowledge of anatomy, human and comparative, of physiology and pathology, and strengthened by experimental research and close clinical observation, Hunter approached what all his predecessors had left untouched, the question of the great principles on which the science of Surgery must be founded, and commenced to teach them in his famous Lectures a hundred and twenty years ago.

Of this new School Cooper became an apt pupil. He had spent the winter of 1787–88 in Edinburgh, where he studied under Gregory and Cullen, and before he went and after his return, he attended the lectures of John Hunter. The opportunity for availing himself of this teaching he owed to his master, Cline, who was a great admirer of Hunter, and had communicated his sentiments to his pupil.

Cline.—Cline's memory is but a tradition, and little is to be discovered of his work. He was an Examiner at this College, and its President, and twice delivered the Hunterian Oration—in the years 1816 and 1824. Neither of these lectures was published; indeed, his only published writing appears to be an essay on the form of animals, issued in 1805.

Yet on his death in 1827, "The Gentleman's Magazine" speaks of him as "a person who would have distinguished himself whatever had been his situation or calling. His strong intellect, self-determination, steady adherence to his purpose, and consummate prudence, would have ensured success in any career of honourable ambition." There is no doubt that his influence upon his young pupil was all for good, directing the idle apprentice, as his biographers

represent him, into the path that afterwards led him to fame. Cline's political opinions favoured the French Revolution, and it was through his acquaintance with the leaders of that movement that Cooper's safety was secured during his residence in the French capital during those perilous times.

Cooper.—The "Prince of Surgery," as Sir Astley Cooper was fitly named by his later contemporaries, was born in 1768. Of his boyish life we need say little, except to note that he was no pale-faced student, burning the midnight oil to gain a precocious lore in the calling he was later to adorn. He was a ruddy, active lad, apt for every prank that healthy boyhood prompted, but disliking books almost as much as he disliked falsehood and meanness. His father, a clergyman of the good old school, understood his frank, generous mischievous son, when he said of him: "He is a sad rogue, but in spite of his roguery I have no doubt he will yet be a shining character," and wisely left him to accumulate that splendid capital of health and strength that made possible his marvellously successful career. There is an anecdote of him that illustrates well his carelessness of self when he could lend a helping hand to others. A village schoolboy had lost his hat in a deep pond and was crying bitterly on the brink, when there came to the spot a young gentleman, dressed in the height of the fashion of the day, a scarlet coat, a three-cornered cocked hat, a glazed black stock, nankeen small clothes, and white silk stockings, his hair hanging in ringlets down his back. Seeing the boy's grief, and learning the cause, he made no more ado but marched into the muddy water, rescued the hat, and handed it to its owner. This young gentleman was Master Astley Cooper returning from his dancing school. The irrepressible boy became the typical medical student of his time, an idle, rollicking ne'er-do-well. His

uncle, William Cooper, then Senior Surgeon to Guy's Hospital, had little control over him; but with his apprenticeship to Cline he suddenly developed an ardent devotion to anatomical study that never left him. The transformation was complete and permanent; and the rest of his life is an extraordinary record of untiring industry.

In 1791 he married, and in the following year went with his wife to Paris, where, in the midst of the turmoil of the Revolution, he found opportunities of associating himself with the great surgical masters of the French School. In the same year his career began as a lecturer at St. Thomas's Hospital, and two years later he became Professor of Anatomy in Surgeons' Hall.

Cooper's Lectures.—When Cooper first commenced to lecture on Surgery he tried to follow in Hunter's footsteps. But at this time he did not possess sufficient authority to lay down great principles. His mind, too, rebelled against wide generalisation, and was better adapted to the close observation and practical application of facts. Warned by the desertion of his audience, he changed his methods, confining himself to the exposition of surgical pathology as illustrated by cases, and to the description of operative procedures. By this means he soon recalled his pupils, and shortly became the most attractive Lecturer on Surgery in London.

These lectures formed a new departure in teaching; for previously, in accordance with School custom, Anatomy and Surgery were taught by one person. But with the approval of Mr. Cline, and the permission of the other Members of the Staff of St. Thomas's and Guy's, he devoted himself after his return from Paris, to developing the subject of Surgery into a separate course; and his lectures upon its principles and practice proved the foundation of his subsequent fame.

South tells us that the old lecture theatre at St. Thomas's was crammed when Astley Cooper lectured, and the stairs and passages were crowded with those who could not find room elsewhere.

The lectures contained enormous masses of facts which their author's large opportunities for practice enabled him to collect, and his powerful memory to retain; and whatever the subject under treatment he was always provided with apt illustrations from his own experience.

His capacity for work was as amazing as that of John Hunter. He rose early and devoted the morning hours to dissection and the making of preparations. He had a dissecting-room over his stables, and here, with the aid of assistants and draughtsmen he did a vast amount of work. After this he would see patients till one o'clock, when, no matter who might be waiting, he proceeded to the Hospital to give a Lecture on Anatomy. He then visited the wards, performed operations, and again visited patients till seven, when he dined. After dinner he gave a Surgical Lecture twice a week at eight, and then visited patients, often till midnight. All this time in his carriage and elsewhere he utilised every spare moment in noting points of interest in connection with his cases and operations, and it was these records and those he kept of his experiments and dissections that formed the basis of his published works. His lectures were illustrated in the most lavish manner; those on Comparative Anatomy at this College, chiefly on the Digestive Organs of Mammals, were accompanied by elaborate preparations, drawings and dissections, which, according to South's estimate, cost £1000 for the single course.

In speaking of necessity briefly of Cooper's work, I should like more especially to refer to that which, by its suggestiveness, the importance of the facts embodied, and the practical

value of the inferences drawn from them, is most worthy of a place in our memory.

Membrana Tympani.—The earliest of his more important contributions to surgical literature were published in the "Philosophical Transactions" for 1800 and 1801. In these he discussed the results of experimental destruction of the membrana tympani, and as a scientific deduction from his observations, proposed the puncture of the membrane for the relief of deafness, due to obstruction of the Eustachian tube. For these papers the Royal Society awarded him the Copley Medal. Before Cooper's time and for long afterwards, it was believed that a perforation of the drum of the ear destroyed the power of hearing. Cooper's experiments showed not only that this opinion was incorrect, but that hearing might persist, and even be improved, by making an opening in the tympanic membrane. Surgically, the operation is of comparatively little value for the purpose for which it was intended, for it is difficult, indeed impossible, to maintain the artificial opening in the tympanum patent for any great length of time. But Cooper's experiments stimulated subsequent observations upon the effects of a breach of continuity in the tympanic membrane, and they showed that it might be incised without injury to the auditory apparatus; and that the operation might safely be undertaken when required, to permit the escape of mucus or pus from the cavity of the middle ear.

Thyroid Gland.—Sir A. Cooper made some interesting observations that are but little known, because unpublished in monograph form, on the Thyroid Gland, describing its alveolar spaces ("cells" he called them), and the fluid contained in them, and demonstrating large lymph channels, some of which he traced to the thoracic duct and the veins. In the Museum at Guy's there was a preparation which he

had made, of the lymphatic channels in the neck of a horse, showing several of these vessels emerging from the thyroid gland, and, after uniting together, entering a vein. In his lectures at St. Thomas's 1788–89 he demonstrated these facts and announced the conclusion, a striking one in the light of our modern investigations, that these lymphatic channels represent the absent duct. Thus, quite a century ago, he enunciated the view favoured by modern physiologists that the lymphatics discharge the function of a duct for the thyroid gland, and that the colloid material in the alveoli is a secretion.

In the course of his researches he examined the thyroids of cats, dogs, sheep, oxen, pigs, and horses, and excised the organ in many dogs, both full-grown and puppies, noting carefully the results which followed, especially the enlargement of the cervical lymphatic glands, a fact which quite recent observations have confirmed. There is no doubt that had his experiments been carried a little farther he might have anticipated Kocher's discovery of *cachexia struma privi.*

Hernia.—In 1804 appeared the first, and in 1807 the second, part of the "Anatomy and Surgical Treatment of Inguinal and Congenital Hernia." Few of us, I suppose, have read the whole of this remarkable monograph, a work that alone would have been sufficient to establish a lasting fame for its author, replete as it is with original observations, carefully digested, expressed simply and clearly, and traced to their practical issues with a directness that might excite the envy of the most advanced workers of our day. He found little more than a chaos of scattered facts and absurd theories where he left order and system. There are, indeed, few points in the anatomy and surgery of strangulated hernia that he has not elucidated; and he has discussed the subject with a fulness of experience that has

never been excelled, and with an insight which has led him to the true significance of almost every fact that his observation had noted.

His errors are few and are chiefly due to the tyranny of tradition, as where he cheerfully prescribes bleeding to syncope as an invaluable auxiliary to the surgeon in the application of taxis, but when he was free to act upon his own unbiased judgment he was rarely at fault. His directions for the treatment of both inguinal and femoral hernia are for the most part those still recognised, and do we not all, either consciously or unconsciously, repeat almost his very words in teaching our pupils to this day?

"The operation for hernia," he says, "is in itself attended with little danger, and the reason it has been so frequently followed by death is by its being performed too late. It cannot be too much lamented and condemned that so much time is commonly lost. Trial after trial is made to reduce the hernia, hopes are entertained that an operation may be avoided, till the rapid progress of the symptoms points out the fatal error of the delay, and when the operation is performed it too clearly demonstrates the impossibility of success." Strange as it must appear, since surgeon after surgeon from the time of the older Hey has striven to emphasise this doctrine, these words present a true story of case after case of hernia admitted to our hospitals down to this very day.

Gangrene of the Bowel.—The treatment of gangrenous intestine, the result of strangulation, receives in this work a considerable attention. The Surgeon is recommended to divide the stricture with all care and with the least possible disturbance of the parts in the neighbourhood of the neck of the sac, for although by so doing some separation of the

adhesions may take place, it is better thus to afford free passage for the fæces and also prevent any extension of the gangrene. The operator should then freely incise the gangrenous intestine and endeavour to evacuate the contents not only of the mortified loop of bowel, but of the canal above the stricture.

Both Travers and Lawrence condemned the practice of dividing the stricture as being unnecessary and calculated to disturb the adhesions and increase the risk to life. But Cooper argues that although in some cases incision alone may be sufficient to empty the overloaded bowel, yet in others the neck of the sac is so contracted and the stricture so tight that the opening is insufficient and should be enlarged. Probably on this point differences of opinion still exist. But the large and deeply interesting question of restoring the continuity of the bowel under these circumstances also occurred to Sir Astley Cooper's mind.

In two cases of gangrene of the bowel Cooper employed sutures to bring the cut edges of the resected intestine together. In one case of femoral hernia he excised a gangrenous loop about two and a half inches in length and united the cut ends of the bowel with three sutures so as to leave a small opening for the discharge of fæces. In another case of femoral hernia he performed a similar operation, leaving the ends of the sutures hanging out and the involved portion of bowel close by the external wound.

One patient died, the other recovered with a fæcal fistula.

He tested the results of Enterectomy, as we should now call it, upon dogs but without much success, owing doubtless to the imperfect suturing of the divided ends of the bowel. In one of the experiments the method of

suture employed resembled that of Czerny; in another he adopted Rambdohr's plan of invaginating the upper into the lower part of the bowel. But, as Cooper justly says, and the lesson may be repeated to-day, it is difficult in a case of hernia to know which is the upper and which the lower end; and the eversion of the mucous membrane renders the method impracticable. He contends that although intestinal suture has occasionally proved successful in animals, the practice is inapplicable to the human subject, from the uncertainty of securing a union between the divided structures; and in 1808 he finally abandoned all attempts in this direction. Nevertheless it is, I think, clear that had Astley Cooper known how to oppose the peritoneal surfaces of the bowel by the introduction of Lembert's, or some other effective form of intestinal suture, he would have arrived at a different conclusion.

I may, perhaps, be here allowed to digress with the view of showing the present aspect of this most important subject upon which Sir Astley Cooper has thrown so bright a light, and in doing so I will also venture to offer some considerations on the radical method of treating hernia drawn from my own experience.

The best practice to adopt in cases of gangrenous hernia is still in dispute. Granted that the patient's general condition is such as to permit a severe operation, is it better to leave the bowel uninterfered with *in situ*, and subsequently perform an operation for the closure of the fistulous opening or artificial anus, which will follow if the patient survive? or is it better at once to excise the gangrenous portion of bowel and to suture the cut extremities? and further, if this method be adopted, is it desirable that the operation should be done within the area of the hernial wound, or, as Cooper suggested, with the addition of a laparotomy, by which we get increased

facilities for manipulation at the cost of some additional risk to the patient?

I was at first inclined to the former plan, but when I practised it I discovered that the separation of the adhesions at the second operation occasioned much delay; while in cases where the loop of gangrenous bowel is in the upper part of the small intestine, there is, in addition to other drawbacks, a risk of the patient becoming starved; hence, I should now elect in a suitable case to attempt an immediate restoration of the continuity of the bowel. In cases of inguinal hernia this may often be accomplished at the seat of the wound; but in the femoral form it cannot be done so readily, except after an abdominal section, as it is very difficult sufficiently to enlarge the area of the external wound. Fortunately for the success of either operation, it is no longer felt essential to resort to those very complicated forms of suturing which some have recommended. To read a description of these inventions is almost enough to deter any one from attempting to carry them into practical effect.

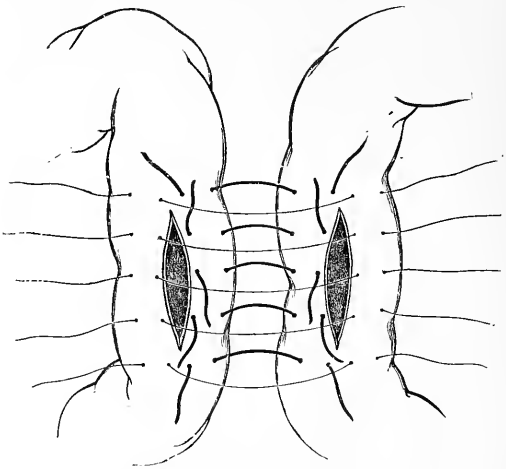
The modern procedures have been of very slow growth and the work of many minds, and are even now still passing through the phases of transition from complexity to simplicity that every great surgical measure has had to survive.

Ordinary manipulative skill will enable the operator to pass a continuous suture through the edges of the divided mucous membrane, and then to introduce the number of Lembert stitches required to bring the peritoneal surfaces into wide contact with each other. This proceeding is simple, and has the inestimable advantage of being quickly accomplished. It is often better to introduce also, after the manner of Lembert, an inner row of interrupted sutures through the everted mucous membrane. This is

the more easy as the mucous membrane always projects, and its ready involution by this method renders the subsequent row of sutures through the serous and muscular coats more secure, since there can be no interposition of mucous membrane.

It is scarcely necessary to refer to the importance of recollecting the absence of peritoneal covering to that portion of the gut which lies between the two layers of the mesentery, to which I called attention in my Oration at the Medical Society six years ago.

Fig. 1.



Halstead's Method of Intestinal Anastomosis.

The ingenious expedient of intestinal anastomosis was not foreseen by Cooper. This too has gained in practicability as experience advances, and in the method of Halstead has perhaps reached a stage of simplicity that leaves little to be desired. (*Vide* diagram.)

Our present position as to the results of resection of the intestine for gangrenous hernia may be gathered from the

TABLE I.

Analysis of 222 Cases of Resection of the Intestine for Cases of Gangrenous Hernia.

Compiled by Mr. Kendal Franks.

Nature of Hernia.	No. of Cases.	Length of Bowel Removed.	Fæcal Fistula Resulting.	Mesentery Excised.	Suture Material.		Result.		Mortality.	
					Silk.	Catgut.	Recovered.	Died.		
Inguinal.	76	Under 12 inches, 48 cases. " 24 " 15 " Over 5 feet, 1 case. (Recovered.)	7	33	27	18	48	28	36·8%	Intestine united over trachea of calf in 1 case. (Recovery.)
Femoral.	93	Under 12 inches, 69 cases. " 24 " 8 " " 40 " 4 "	6	20	28	27	48	45	48·3%	Senn's plates, and row of Lembert's sutures used in 1 case. (Recovery.) Senn's plates and omental graft in 1. (Fatal.)
Umbilical.	15	Under 12 inches, 12 cases. " 24 " 3 "	1	5	7	4	6	9	60%	
Not Stated.	38	—	—	—	—	—	16	22	57·8%	

222 Cases, with Mortality of 46·8%.

interesting collection of cases made by Mr. Kendal Franks, an analysis of whose tables I present to you to-day. (Table I.)

It will be seen that the cases number 222 with a mortality of 46·8 per cent. This death-rate, however, is doubtless too small, as possibly many fatal cases have not been recorded; while probably all successful ones have been published. It must of course be remembered that the mortality is for the most part attachable to the conditions for which the operation is demanded, rather than to the operation itself; and this being granted, the figures inspire us with confidence to persevere in utilising the resources which modern methods have rendered so hopeful.

Radical Cure of Hernia.—Another important advance that we have made upon the position occupied by Sir Astley Cooper is in the general adoption in every suitable case of measures for obtaining a radical cure of hernia. He mentions that proposals had been made for cutting away the hernial sac, or tying its neck, during the operation to relieve strangulation, and in one case of femoral hernia he tried this plan, but nevertheless another hernia formed and he concludes that the removal of the sac will not prevent a return of the disease, probably because it does not diminish the aperture by which the rupture descended. The ligature of the neck of the sac he considered open to many objections, especially in inguinal hernia, and he was fearful of exciting the much dreaded peritonitis, the *bête noire* of the surgeon of the past. Sir William Lawrence, too, in his work on Rupture, emphatically condemns any operation for attempting a cure in cases of reducible hernia, "as the patient's life is thereby endangered to rid him of an inconvenience, and the operation affords no greater prospect of entire recovery than he had without it." There is little doubt that the

TABLE II.

Analysis of the Results of the Operation for the Radical Cure of Ninety Cases of Non-Strangulated Hernia.

By Sir William Mac Cormac.

	Number of Cases Operated Upon.	Noted as having Healed by First Intention.	Cases which Suppurated.	Average Duration in Hospital after Operation.	Cases Known to have Worn no Truss since the Operation.	Wearing a Truss now.	Relapses.	Deaths.
Inguinal.	80	56 (80 %)	14 (20 %)	32 days.	39	7	4	1 from acute broncho-pneumonia in a child of 2 years, 3 days after the operation.
Femoral.	6	5 (83 %)	1 (17 %)	32·5 days.	2	2	—	—
Umbilical.	3; and 1 ventral.	2	—	17 days.	—	—	—	1 from cerebral embolism due to detachment of vegetations on the aortic valve, in a woman of 50, 36 hours after the operation.

	Inguinal.	Femoral.
Operations for the Radical Cure of Non-Strangulated cases of Hernia, performed by other Surgeons of the Hospital . . .	123	17
Fatal	9 (7·32 %)	0

(*For the details of these cases, see Table VI. in the Appendix.*)

opinions of Cooper and Lawrence were largely justified by the conditions that prevailed in their day, but with the modern operation under antiseptic precautions the danger has been minimised, the security against return is enormously enhanced, and surgeons all over the world are striving in one way or another to perfect the technique of the procedure and to improve still further the good results already attained.

To give examples of the number of instances in which during the past few years an attempt has been made to effect a cure in cases of non-strangulated or reducible hernia I may mention that the whole number of operations performed in cases of this kind by myself amounts to ninety. Mr. Arthur F. W. King, a former dresser, has been good enough to take much trouble to tabulate these cases. They are summarised in Table II. and the more important details are embodied in an Appendix, Table VI.

I am fortunately able to say that in no instance was a fatal result directly attributable to the operation. There were but two deaths, one from broncho-pneumonia, in a child of two, and one from cerebral embolism in a woman of fifty.

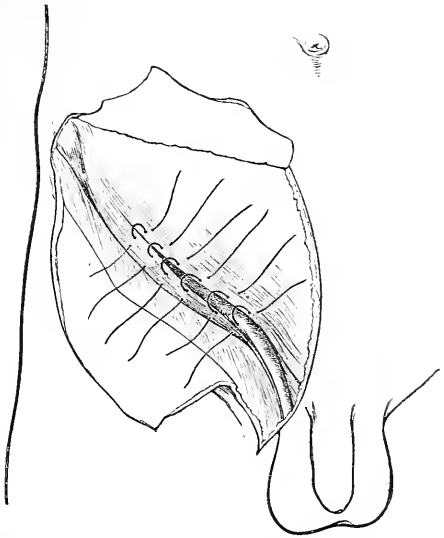
I need not enter into the details of the operation I perform as I have described it elsewhere.* The essential feature of every operation is to seal or remove the peritoneal pouch up to the level of the internal abdominal ring and to ensure the absence of any pouching in this situation. Beyond this there are various methods, multiplying yearly for the so-called closure of the inguinal canal, a closure, by the way, that can never be complete so long as the passage transmits the spermatic cord. It has seemed, however, to me to be of much advantage to strengthen the abdominal wall over the whole length of the inguinal canal, and for a short distance above it,

* *Clinical Journal*, March 29th, 1893.

by a series of deep sutures passed through all the deep structures on each side as represented in the diagram.

This method of introducing deep sutures tends to remove the somewhat flaccid condition of abdomen common in persons who are the subjects of acquired hernia; it materially increases the power of resistance of the tissues at the internal ring where the hernia is

Fig. 2.



Manner of Introducing Buried Sutures to Strengthen the Inguinal Canal.

so apt to re-appear, and for months after a broad hard resisting bar may be felt occupying the line of the canal, while the closure appears as solid and complete as is possible, or as it is in Bassini's or any other of the more complicated procedures.

In cases of congenital hernia the lower portion of the sac is cut off and left to form a tunica vaginalis for the

testis. Not uncommonly an incompletely descended testicle is associated with this form of hernia. And if, as is usual, it is undeveloped, and lying in the inguinal canal, it may be removed with advantage. I have had occasion to do this in two or three instances; otherwise it may be pushed back in the abdomen. On the removal of the dressings, which were usually left untouched for a week, the wound was generally found to be united by first intention. The sutures are then taken out, and a light dressing applied. After three weeks the patient can sit in his chair, and is soon afterwards discharged with the injunction to avoid any severe straining effort for four more weeks. I have not, except in a very few instances, ordered a truss.

I think silk is best for the buried sutures, other surgeons adopt by preference a different material. Bull uses kangaroo tendon, and he applies a light plaster of Paris splint from the level of the umbilicus to the ankle, to keep the parts at rest, and further the healing process. In their paper, Bull and Coley mention forty cases varying in age from eight months to fourteen years, where this plan had been used. All recovered from the operation, in thirty-eight of the forty cases absolute primary union was secured, and in nearly all, the children were up and about the ward in from two to three weeks.

With regard to the risk of life it must be regarded as very small, and in the appended Table III. the results of 2224 cases have been tabulated, with 32 deaths, a mortality of 1·43 per cent.

Championnière, of the St. Louis Hospital, mentions in a letter sent to me a few months since, that he had operated on 376 cases of non-strangulated hernia with but two deaths—one from pulmonary congestion and one from internal strangulation, and also that at that

TABLE III.

Mortality after Operation in Cases of Non-Strangulated Hernia.

	Cases.	Deaths.		Cases.	Deaths.
Mac Cormac	90	2: 1, from pulmonary congestion, 1, from cerebral embolism.	Bull	118	2
			Parker	86	0
Championnière	376	2: 1, from pulmonary congestion, 1, from internal strangulation.	Wood	339	7
			Socin	75	2
Berger	128	1, very large hernia with many adhesions.	Neve	55	2
Bassini	262	1, from pneumonia 15 days after.	Lockwood	45	1
			Wolf	33	2
Schede	72	0	Mac Burney	36	1
Kocher	106 119 operations.	1, from embolic infarcts in the lungs 15 days after. No abdominal complications. No peritonitis. Wound healed.	Ball	22	0
			Escher	23	1
			Poore	25	0
Banks	117	7	Küster	40	0
Barker	50	0			
Macewen	52	0	Total	2224	32 = 1·43%
Halstead	74	0			

time he had operated in 120 cases in sucession without a death.

In Lariboisière, Berger had operated, he informs me by letter, up to November 1891 on 50 cases without a death, and since then in 78 cases of inguinal hernia, with one death. In this instance the hernia was the size of the adult head, with many adhesions, and death was due to intestinal obstruction. He notes, amongst interesting complications, that in one case intra-peritoneal hæmorrhage occurred from the omentum : it was recognised in time, and the bleeding points secured ; in two cases the bladder was cut into, and twice the vas deferens was ruptured. Once the femoral vein was also wounded in an operation for femoral hernia, but these accidents were not attended by any serious consequences.

Bassini has operated in 262 cases with one death. Schede records 72 cases he had operated upon, all of which were successful. Of Kocher's 106 cases in which 119 operations were performed, one died fifteen days after from embolic infarcts in the lungs. There was no peritonitis, the wound was quite healed, and the cause of death appeared to be unconnected with the operation. Eighteen were cases of double hernia, the youngest patient was nine months, the oldest seventy-one years.

Professor Küster, of Marburg, has been kind enough to inform me by letter that he has operated upon 40 cases of non-strangulated hernia during the years 1884–1891. All of these recovered, and during the same period he operated on 46 cases of strangulated hernia, of which 7 died from causes not connected with the operation. Of the 77 patients who recovered, in 61 primary union occurred in the wound, and in 16 suppuration took place. As regards the final results observed in 67 patients after at least eighteen months had elapsed, 61, or 91 per cent.,

remained free from any reappearance of the hernia. In 6, or 9 per cent., a relapse occurred.

Other surgeons have been less fortunate. Billroth in 51 operations lost three patients, Czerny a larger proportion. Wolter calculates the mortality at 4 per cent., while Leisrink, in 202 operations, had a death-rate of 7·4 per cent., Anderegg's mortality was 3·6, and Adler's 3·5.

There is, however, evidence of increasing improvement in the details of the operative procedure, and if every precaution be taken, there is no adequate reason why it should not be equally successful in the hands of all, and the mortality reduced practically to nothing.

TABLE IV.

Immediate Healing of the Wound.

Name of Operator.	Immediate Healing of the Wound, without Suppuration, took place in
Mac Cormac . . .	80%
Kocher	89%
Billroth	39%
Schede	35%
Macewen	86·7%
Ball	81·8%
Mac Burney . . .	81·6%
Halstead	82%
Thornley Stoker . . .	33·3%
Mayo Robson . . .	63·5%
Poore	84%
Wolf	90·9%
Küster	79%

Interesting in a special way as well as on general grounds, is the duration of treatment and the manner in

which the wound unites. Table IV. affords information on the latter point. In my own cases quite 80 per cent. healed immediately, and the average duration of the treatment was a little over one month. Kocher ascribes entirely to careful antisepsis the fact that 89 per cent. of his cases healed by first intention. He permits his patients to rise in a week and to return to work in little over.

The after-results of such an operation are the best tests of its merit; but where hospital patients are concerned they are difficult to obtain. During the summer, for the purpose of illustrating a clinical lecture on the subject, I was able to present eighteen quite unselected cases to the class. They varied in age from ten up to fifty-five years, and the interval which had elapsed from the operation varied from a few weeks to nearly three years. Nevertheless fifteen of these were in a thoroughly satisfactory state, and showed no sign of any return; three who had worn strong trusses exhibited a general weakness of the part, but there was not any actual protrusion.*

In private cases very satisfactory results were also realised. Many of the patients have been under observation for years, and several entered as cadets at Sandhurst, where they had to undergo the very severe strain which military rough riding and the gymnasium entail. In none of these have I heard of any return.

In respect of the final result I can only trace four cases of relapse in my total number of ninety operations. Forty-three were ascertained to be without any return, and in twenty-eight of these the interval varied from two to six years.

In 112 of Championnière's cases which he was able to keep under observation, thirty had gone for two years

* *Clinical Journal*, March 1893.

without relapse, and in eleven others the cicatrices were solid after four years and longer.

Kocher determined the final issue in ninety-four of his cases, and found 80·8 per cent. were cured, while 19·2 per cent. had relapsed. In most of these an interval of two years had elapsed, and after this the probability of subsequent relapse does not exceed 2 per cent. Nineteen per cent. of the relapsed cases were of inguinal hernia, while 33 per cent. were femoral.

Berger has seen but two cases of relapse in patients he operated upon before 1891, and some of these date from two to four years, while others were of shorter duration. Not one of his cases operated upon since 1891 presented any sign of recurrence. The operation he employs is a modification of Bassini's.

Two hundred and forty-one patients, in whom 247 operations were performed by Bassini, were traced by him. In 47 no relapse had occurred after two years, and 108 had no recurrence after periods varying from one to four and a half years.

Schede states that he found the percentage of relapses in all his cases to be ten; but two of these were finally cured after a second operation, and four wore a truss.

In Bull and Coley's cases, which were closely watched, only two relapses took place. These were ascribed to faulty operation, as the wounds suppurated and the sutures sloughed out.

Bull estimates the proportion of relapses as only one in fifty cases. I have also shown in Table V. the proportion of recurrency in 1524 cases, and in Table IX. the results of some 2500 cases operated upon by a considerable number of surgeons.

The older collections show much less favourable results than those previously quoted. Anderssen gives 50 per cent.

of relapses, Socin 39 per cent., Wolter 25·9, Svenson 21 per cent., and Leisrink 20 per cent.

In conclusion I think we may say that recent statistics go far to show that the mortality after the operation for the radical cure is practically nominal, that the wound heals

TABLE V.

Proportion of Relapsed Cases.

	Number of Operations Traced.	Number of Cases in which Relapse was Traced and Per Centage.
Mac Cormac	55 cases traced.	4=7·2%
Kocher	94 cases which were traced	20=19·2%
Berger	50 cases operated on before 1891.	2=4%
Berger	78 cases operated on since 1891.	No relapse.
Bassini	241 pat ents, 247 operations, were traced.	7=2·8% in 155 no return had occurred after periods varying from 1 to 4½ years.
Schede	72 traced	7=10%
Bull	118 ,,	2% (Estimated)
Barker	38 ,,	9=24.2%
Ball	22 ,,	3=13.6%
Macewen	52 ,,	1=1.9%
Mac Burney	36 ,,	1=2.7%
Halstead	74 ,,	9=12.1%
Poore	25 ,,	0
Escher	23 ,,	3=14%
Billroth	51 ,,	4=7.8%
Socin	17 ,,	9=52.9%
Championnière	112 ,,	14=12%
Marcy	79 ,,	4=5.06
Thornley Stoker	3 ,,	1=33.3
Kendal Franks	20 ,,	4=20%
Mayo Robson	11 ,,	2=18.2%
Thirier	14 ,,	2=15%
Neve	55 ,,	7=12.7%
Banks	117 ,,	17=14·5%
Küster	67 ,,	6=9%

1524 Cases. Average proportion of relapses=8·5%

quickly and well, and that probably a much shorter duration of after-treatment than that usually considered necessary may be found sufficient, and they also prove that a very large proportion of the persons operated upon are cured.

As regards the indications for the operation differences

of opinion prevail. It appears to me called for in nearly all otherwise healthy individuals in whom the hernia is wholly or partially irreducible, where it is imperfectly retained by a truss, or where the hernia is large or a source of much inconvenience.

In boys and young men, in whom the hernia is almost always of the congenital form, the operation is strongly indicated. It spares them the prolonged use of a truss, which is so little likely to cure them, and it fits them for the active occupations of life.

Although youth points strongly to the desirability of the operation, yet under otherwise favourable conditions it may be properly undertaken up to late adult life.

Many consider that the operation should not be performed in quite young children or infants, on account of the difficulty of maintaining aseptic conditions, and the possibility of cure by a truss; but Bull, Kocher, Schede, Rushton-Parker, and others have obtained the best possible results in children, and even in infants from the age of a year or even less upwards. Certainly I should consider the operation indicated in childhood if the hernia cannot be effectively restrained by a truss.

Of course the presence of organic disease or general ill-health contra-indicates the performance of this, as it would that of any other not absolutely necessary operation.

Success depends on the method employed, the essentials being the complete removal of the sac, a sufficient closure or support of the canal by buried sutures, and the rapid healing of the wound without suppuration. The comparative smallness of the hernial orifice, the limited bulk of the rupture, as also its being single, enhance the prospects of cure. Probably an insufficiently high ligature

of the hernial pouch, which would leave a potential sac for the formation of a new hernia is the chief causal element of relapse, as well as the occurrence of suppuration, especially in connection with the deep sutures. Cases of hernia of great size with a wide neck, and cases of double or multiple hernia, frequently relapse.

It would be difficult, I think, to point to any larger, or more successful, extension of the range of operative surgery as applied to a single form of disease than this one, and the propriety of the operation, if there be any who still doubt it, has, I submit, been abundantly justified by its incontestable benefits and insignificant rate of mortality. If I seem to have unduly dwelt upon this important subject I would crave the indulgence of my hearers, and will now revert to the labours of the great surgeon who is my theme.

Arteries.—Cooper's experiments upon the ligature of arteries, and the nature and extent of the collateral circulation which is afterwards established, were of far-reaching importance. In the Museum at St. Thomas's are preparations showing the effects of ligature of one and both carotids in dogs, which are alleged to have shown no alteration, either of habit or disposition, in consequence. To the courtesy of the authorities at Guy's I owe the privilege of showing this example of the successful ligature of the aorta in a dog, upon the strength of which Sir Astley afterwards attempted to secure a similar result in man.

In 1817, when the abdominal aorta was tied by Cooper for the first time, his enterprise left very far behind every kind of surgical operation which had previously been attempted. The circumstances of the case afford a good illustration of his readiness to cope with a sudden emergency. An aneurism of the external iliac artery which

was rapidly increasing in size had been treated ineffectually by pressure and other means ; sloughing occurred, hæmorrhage succeeded, and death seemed inevitable. The sac was then laid open and the artery sought for in vain amidst a chaos of broken-down coagula.

Under these circumstances Cooper determined to tie the abdominal aorta.

He made an incision in the linea alba of three inches in length, opened the peritoneal cavity, scratched through the investment of the artery, and with an aneurism needle passed a ligature round it. The patient was nearly moribund at the time of the operation, and succumbed next day, forty hours after.

After death the vessel (the preparation lent from St. Thomas's Museum is upon the table) was found to be tied three quarters of an inch above the bifurcation, and was filled with clot an inch long both above and below the ligature. It strikes one, in examining the common iliac artery above the aneurism, that this vessel would have borne a ligature, but it is useless now to speculate as to Cooper's reasons for tying the main trunk.

It is interesting to remember that the most recent operations for ligaturing the great arteries in the abdomen (although practised under very altered conditions) are performed, like that of Sir Astley Cooper, through the abdominal cavity.

Cooper was the first to demonstrate the practicability and safety of tying the common carotid artery, and thus indicated the means whereby an otherwise certainly fatal condition might be cured or relieved. When describing the operation, he mentions having applied two ligatures to the vessel half an inch apart, and as that was the largest interval by which they could be separated, he judged it better not to divide the vessel between, as he had

apparently otherwise intended to do, and which he did do in the second and successful case, a practice which has recently been somewhat extensively revived. (Preps. exhibited).

Dislocations and Fractures.—His treatise on Dislocations and Fractures, which was published in 1822, was of no less importance than his earlier work on hernia. Both are monumental. Before his time our knowledge of these injuries was but little in advance of that of Hippocrates. In fact some authorities of note made comparisons greatly in favour of the father of medicine; but with the appearance of Cooper's treatise all was changed. This magnificent record of wide and penetrating observation distinguished clearly the salient features of each injury, and pointed to the most natural remedy. Our additions to this work indeed are but few when compared to the vast expansion which he gave to the knowledge of his time. We may, however, boast that we have added to the simplicity and efficacy of the reduction of dislocations by the introduction of manipulation to replace the cumbrous apparatus of former years, and our methods of treatment of fractures are more merciful and more satisfactory in their results.

At the beginning of this century it was doubted in many of our schools whether the hip-joint could be dislocated, and those who admitted the possibility questioned the practicability of reduction. Cases were continually met with in the hospitals where dislocations had been treated as fractures until the period was passed when reduction could be accomplished. Other cases equally numerous occurred where great and often irreparable injury was inflicted by pulling on a fractured limb in the belief that it was dislocated. The result of Cooper's researches was to dispel a cloud of ignorance and error, to

render almost every fracture and dislocation easy of recognition, and to lay down simple and effective methods for their treatment.

Diseases of the Breast.—His work on the Anatomy of the Breast, founded on upwards of two hundred and fifty dissections contained in his museum, was written in 1839, when he had passed the age at which the activity of mental productiveness is usually preserved. He says with pride that he has consulted his own preparations only, and wishes every anatomist would act in like manner.

His volume on Non-malignant Diseases of the Breast is distinguished for the means it affords of separating the simple from the malignant forms, and the sound precepts it formulates as to what tumours may be removed without fear of return. The Chronic Mammary Tumour of Sir Astley Cooper is well known by that name to the present day, and the description he gives of it in the fourth chapter is a model of accurate and lucid clinical observation, from which there is nothing to take away and but little to add. (Preps. R.C.S.)

In the preface to this book he remarks how some of these swellings which had long existed in an indolent state will subsequently display a malignant disposition, which may render their extirpation necessary. On such experience indeed our modern practice is based ; for most surgeons will agree that a chronic mammary tumour, or fibro-adenoma as we would call it now, should be removed, as it may at any time be transformed into an adeno-sarcoma.

Diseases of the Testicle.—One of his best works is that on Diseases of the Testicle, published in 1830. His beautiful injections, which are to be found in our Museum * clearly illustrate its structure. Profiting by his great

* A series was exhibited.

experience, he made distinctions of much practical importance in the chronic tumours of the organ which had previously been confounded under the common term cancer, established important differences in the manner of dealing with them, and in the results to be expected from operation. While many surgeons believed that the testis was rarely affected by syphilis, and some that it never was, he showed that the organ was often involved in this disease, and that it would only yield to a mercurial treatment. Tuberculous affections of the secreting glands, at that time believed to be rare, were also shown by Cooper to be common in the testicle.

When we remember the obscurity which surrounded the swellings known as sarcocele, and about which nothing else was known, we may better appreciate the light thus projected into the previous darkness.

Urethra.—Cooper appears to have frequently punctured the membranous portion of the urethra in cases of retention from stricture, in preference to tapping the bladder above the pubes or through the rectum. Mr. Travers mentions he had often seen it done whilst he was Sir Astley's apprentice. The operation is the one generally known by the name of his nephew, Mr. Cock. I might quote other matters of practical moment in Cooper's original work, but I have perhaps said sufficient.

He possessed in his house the finest private anatomical collection in Europe. His private museum was one of his greatest achievements, and in England at that time probably unique. It showed his genius for collecting, and furnished an example of how much could be done by a single individual. He preserved most of his preparations as they had served for the illustration of his published works. His anatomical and pathological collections were the result of his own labours, prepared for the most part

during the latter part of his career, when the energies of most men begin to flag. It is said these contained some three thousand preparations admirably prepared and arranged, especially the injected specimens. About five hundred preparations formerly belonging to him are now in our College Museum, besides a large number at St. Thomas's and at Guy's.

Sir James Paget tells me that Sir Astley Cooper deserves honour for having been one of the few who, in the beginning and early part of this century, promoted the science of pathology by the study of morbid anatomy. At that time there was not in any school in London, nor indeed in any part of the country, any place for the objective study or teaching of pathology. Pathology as then taught was little more than a summary of the hypotheses, which were supposed to be the foundation of practical medicine and surgery. The visible consequences of diseases were looked at in bodies examined after death, but few of them were carefully described, fewer still were reserved for more careful study. Hospital museums were unknown or neglected. The chief or only museums for morbid anatomy were private collections, as those of the Hunters had been; and among the collections in London the best was Sir Astley Cooper's. The museum of the College may show what it was, for the Council very wisely purchased it as soon as this became possible, as they did also the private collections of Longstaff, Howship, Liston, and some others. The contents of these once private museums, or the best specimens selected from them, form an important part of the present Pathological Museum of the College; and among them all none display so perfectly as Sir Astley Cooper's the art of showing, to the naked eye, morbid changes of structure in the most demonstrative manner; they remain not only as illustrations of his

written works, but as admirable examples of skill in injections and in well-planned sections. Many of them are even now as instructive for study by the unaided sight as they were when first taken from the dead body, or removed by operation during life, at a period when the naked eye and the fingers were the only means for the study of pathological anatomy.

It can scarcely be doubted that this portion of Sir Astley Cooper's work contributed largely to the growth of the conviction, though this growth was very slow, that morbid anatomy must be thoroughly taught in our medical schools; and a token of his influence may be seen in the present condition of our hospital museums, and the almost complete absence of private anatomical collections.

It is not difficult to construct a mental picture of Sir Astley Cooper from the records his contemporaries have handed down to us. I have already spoken of his boyhood, and have shown how the spirited but idle scapegrace became one of the most determined and successful workers of his day. We may now recall him as he was in his prime; a stately presence, tall and well-proportioned in figure, broad of chest and broad of brow, with bright complexion, clear candid eyes, and a refined and gentle but firmly cut mouth. It was thus that Lawrence saw and painted him; and his character in no wise belied the promise of his form and features—a man of quick perception, accurate in observation, ready of resource, and untiring in effort. All of these faculties were abundantly attested by his professional life, and won him success; but he had other qualities that endeared him to all who came within his sphere of influence: a free-handed generosity, a cheery humour, and an unswerving sense of truth and honour. Temperate without asceticism, a good listener and a good talker, he was the best of companions. Of his

kindliness there are many stories. Let a friend in distress beg of him a loan, and he does what we should expect of the man who when a lad had walked into the muddy pond, all in his finest array, in order to dry the tears of a capless schoolboy; he sends a draft for ten times the amount asked, to be repaid or not, according to the convenience of the borrower. And when the poor struggling man or woman came to his consulting-room sadly needing his skill and yet ill able to spare the golden guinea that was to pay for it, for such a one we are told were reserved his gentlest courtesy and kindliest interest, in order that no feelings might be wounded when he declined the proffered fee. Such was Sir Astley Cooper, one of the greatest masters in a noble calling, and a true-hearted gentleman in all his thoughts and actions. We are proud to remember that he belonged to us.

When he was appointed Sergeant-Surgeon to the King, Cooper was about fifty-six. The life of no surgeon had been more happy or more filled with good work. He was honoured by men of every rank among his contemporaries, was successful beyond all rivals in the practice of his profession, and beloved almost to worship by his friends. But his health had begun to suffer. For a time he gave up practice and retired to the country; but he could not settle to the life of a country gentleman, and his energies becoming in part restored, he returned to active professional work in 1828, and published in succession during the next four years his works on the Diseases of the Breast, the Diseases of the Testicle, and the Anatomy of the Urethra; and his last completed work was the Anatomy of the Breast published in 1839, two years before his death.

Up to the last Cooper was engaged in physiological and anatomical inquiries. He was indefatigable in the search

after knowledge, and in the accumulation of fresh facts and new experience; and although he became more and more ailing he continued to do what work he was able for, saying he would die in harness. He viewed death like a philosopher, neither wishing for it nor fearing it. Some time before his last illness a false report arose that he had been struck with apoplexy, and in reply to an anxious letter from his nephew Bransby, he placidly announced that he had had no fit except a fit of hunger, and that he had, moreover, been subject to fits of this kind at short intervals all his life. That he was prepared, however, was proved by his will which enjoined that his remains should be subjected to autopsy, and pointed out the directions in which investigations were to be made to explain symptoms he had noticed during life. The end came when he had reached the age of seventy-three. A few minutes before he passed away he said to the friends who surrounded him "God bless you, and good-bye to you all." They were his last words.

He was buried with befitting ceremony in the Chapel at Guy's. The statue to his memory in St. Paul's Cathedral, the finer monument at Guy's Hospital, and the beautiful portrait by Sir Thomas Lawrence which adorns our College walls, preserve for us the semblance of his outward form and features. What he did for the advance of the science to which his life was dedicated cannot be more tersely summed up than in the words of Brodie. "His published works," he writes, "will remain as long as surgery is cultivated, filled, as they are, with important facts, and containing the clearest rules of diagnosis. They will transmit his name to posterity with those of Sydenham and Hunter as a benefactor to the human race."

Few, more than Cooper, have so abundantly discharged the debt which every man is said to owe to his profession;

and if we would realise what we owe to him we have but to compare the condition of surgery as he found it and as he left it. He belongs to that goodly company,

> "The choir invisible of those immortal dead,
> That watched to ease the burden of the world;
> Laboriously tracing what must be,
> And what may yet be better."

My task, Mr. President and gentlemen, is ended, and I have only now to express my wish that this Bradshaw Lecture, to which you have so kindly and courteously listened, had been more worthy of its subject, more worthy, too, of this place and of this audience.

APPENDIX.

STATISTICS OF HERNIA:

PREPARED FOR THE BRADSHAW LECTURE
OF 1893.

TABLE VI.

Table of Ninety Cases of Operation for the Radical Cure of Non-Strangulated Hernia, performed by Sir William Mac Cormac from 1874 to 1893.

Date of Admission.	Nature of Hernia.	Date of Operation.	Age.	Sex.	Reducible or Irreducible.	Subsequent Progress.	Duration of Treatment in Hospital.	Result on Discharge.	Date when last seen or heard from. Condition then, and Period Elapsed since Operation.	Remarks.
							DAYS			
30/10/74	Inguinal (R.)	3/12/74	39	M	Reducible, some adherent omentum.	Suppuration.	91	Thickening in inguinal canal. Truss.	Relapsed.	Wood's operation. Silver sutures. Hernia very large. Not retained by truss.
13/11/83	Double Inguinal.	1/12/83	48	M			48		No address.	Both herniæ operated upon, on same day. Sutures of chromic gut to rings. Cystitis subsequently.
5/11/84	Inguinal (R.) Infantile.	22/11/84	9	M	Reducible.	Wound gaped. Granulated up.	20		No address.	Two sacs found. First empty; removed. Second; to outer side contained omentum.
*	Inguinal (R.) (G. A.)	3/85	44	M	Irreducible.	Healed by first intention.		Complete cure. Discharged wearing a truss.		Very fat man. Large hernia, since childhood, size of a cocoa-nut. Much omentum removed. Many old adhesions. Had maniacal symptoms for 3 days.
1/2/86	Inguinal (R.) Congenital.	6/2/86	26	M	Reducible.	Suppurated. Bronchitis on both sides 4 days after operation.	53	Good. No truss worn.		Had hernia for 18 years. Truss failed to keep it up. Two drainage tubes inserted.
3/4/86	Inguinal (L.) Entero-Epiplocele.	1/5/86	43	M	Reducible, some adherent omentum.		95	No impulse on coughing. Wearing truss.		Was in 2 years previously for hernia, which was then found to be irreducible. At operation atrophied testicle found in upper part of swelling. Neck of sac ligatured with catgut. 4 sutures of catgut to ring. Two drainage tubes, 1 of which was in peritoneal cavity.

7/1/87	INGUINAL (L.) Entero-Epiplocele.	2/2/87	48	M	Irreducible.	Suppurated.	38	No impulse on coughing. Light truss worn.	No address.	At operation: component parts of cord were spread out and surrounded neck of sac.
* 28/12/87	INGUINAL. (P. F. P.)		16	M			28	No truss.	Gone away. No address.	
24/1/88	INGUINAL (R.)	18/2/88	54	M	Reducible.	On 5th April there was a small sinus left. A drainage tube was inserted.	50		Not known at address.	Ruptured 30 years. Operated upon at Middlesex Hospital, March 1863, for strangulation. Hernia too bulky to be kept up by truss, so came for radical cure. Neck of sac ligatured with silk and then divided. Sac left in situ. 4 silk sutures in pillars. Intestine appeared below ligatures, having apparently come through slit in neck of sac above ligatured point. Sinus on discharge due to silk suture.
7/3/88	INGUINAL (R.)	10/3/88	25	F		Slight suppuration.	27	No truss or bandage.	Heard Sept. 9/93. No return of rupture. 5 years 6 months. No truss now. Wore one for short time after operation. "2 years after operation pelvic abscess formed near site of operation."	At operation no appearance of hernia, but sac could be isolated. Sac transfixed at neck with kangaroo tendon, which was tied on either side, and ends carried circularly round neck and tied again. Sac extended to pubes, and was probably an abnormally long unobliterated canal of Nuck. In the part removed, which was a little over 1" long, a portion of round ligament was recognised. External pillars sutured with 3 catgut sutures (No. 5).
12/6/88	INGUINAL (L.) Congenital. Epiplocele.	23/6/88	16	M	Reducible.	Healed by first intention.	34	Went out with truss.	Seen Aug. 29/93. No return of rupture. 5 years 2 months. Wore truss for first year after operation. No impulse. Scar firm.	Sac adherent to spermatic cord. Ring closed with 2 catgut sutures.
* 7/12/88	INGUINAL. (G. G.)		21	M		Healed by first intention.	28	No truss.		

* Performed in private.

Table of Operations for Radical Cure of Hernia (continued).

Date of Admission.	Nature of Hernia.	Date of Operation.	Age.	Sex.	Reducible or Irreducible.	Subsequent Progress.	Duration of Treatment in Hospital.	Result on Discharge.	Date when last Seen or Heard from. Condition then, and Period Elapsed since Operation.	Remarks.
							DAYS.			
12/3/89	Inguinal (R.)	12/3/89	52	M		Suppuration in track of drainage tube. Counter openings made in scrotum and iliac fossa. 16 days after operation. Cystitis.	60		Not known at address given.	Sausage-shaped swelling in inguinal canal 2½" long. Hard, dull on percussion, tender. History of 17 years. Worn truss. Nothing found in sac. Sac walls very thick (⅛") and firm. Sac excised. Ring closed with catgut.
* 22/3/89	Inguinal. (E. E. E.)		24	M		Healed by first intention.	25	No truss.	Heard Oct. 2/93. No return of rupture. 4 years 6 months. No truss. "Perfect cure."	Ruptured at polo.
* 11/6/89	Inguinal. (A. L. G.)		19	M			18	No truss.	Sept. 28/93. No return of rupture. 4 years 4 months. No truss.	
* 12/7/89	Inguinal. (D. M. W.)		39	M	Irreducible.	Suppurated and the deep sutures sloughed out.	52	Wore a truss, but relapse took place after a year.	No fixed address—Annam or China.	Very fat man. Very large hernia, only partially reducible, containing a large quantity of adherent and altered omentum, which was removed. Rings large enough to admit 3 to 4 fingers.
* 29/7/89	Inguinal. (B. A.)		17	M		Healed by first intention.	26	No truss.	No return up to present date, Oct./93. 4 years and 3 months.	Right congenital. 3 sutures.
*	Inguinal (L.) (L. C. G.)	2/3/90	10	M		Healed by first intention.		Cure.	Heard by letter. Sept. 28/93. No return of rupture. 3½ years. No truss. "Most satisfactory."	Testis in groin. Removed at operation.

25/3/90	INGUINAL (L.)	30/3/90	25	M	Reducible.		12		No address.	
3/5/90	INGUINAL (R.)	4/5/90	68	F		Suppurated.	56	No truss.	Aug. 28/93. 3 years 3½ months. Ring weak. Occasionally slight protrusion. No truss since operation.	Noticed lump 2 days. Tense. No impulse on coughing. No vomiting. No intestine or omentum found in sac. Walls of sac ¼ inch thick, and more in places. Catgut sutures through pillars of ring.
13/5/90	INGUINAL (R.) Epiplocele. Funicular.	24/5/90	14	M	Reducible.	Healed by first intention.	23	No impulse felt over ring on coughing. No truss.	Aug. 30/93. Rupture returned. 3 years 3 months. Wears a truss now and for the last year. Did not go out with one.	Omentum excised.
*24/5/90	INGUINAL (R.) (Major J.)	23/6/90	35	M	Reducible.	Healed by first intention.	19	Cure. No truss.	1893. Reported well. 3 years.	Had been operated on by Prof. J. Wood in 1876. Recurrence in 9 months.
*	INGUINAL (R.) Congenital. (H. F.)	4/7/90	11	M	Reducible.	Healed by first intention.	14	Cure. No truss.	1893. No return of rupture. 3 years.	Right testis non-descended, non-developed. Excised.
*	INGUINAL (R.) Epiplocele. (W. W.)	14/10/90	45	M	Irreducible.	Healed by first intention.		Cure. No truss.	1893. No return of rupture. 3 years.	Omentum excised.
6/6/90	DOUBLE INGUINAL.	7/6/90	23	M	Reducible.	Both healed by first intention.	27	Both wounds firmly healed.	Gone, address uncommunicated.	Both herniæ of large size. Both operated upon on the same day. Left testicle undescended, undeveloped, and removed. Right vaginal process was unobliterated.
* 12/12/90	INGUINAL. Congenital. (R. V. T.)	13/12/90	18	M	Reducible.	Healed by first intention.	27	No truss.	Oct. 93. No return. No truss. 2 years and 10 months.	
*	INGUINAL (R.) (J. W. R.)	16/12/90	56	M	Reducible.	Healed by first intention.		Cure. No truss.	1893. Reports himself "sound as a drum." 3 years.	Ruptured in 1889.
*	INGUINAL (R). (S.)		32	M		Healed by first intention.		Recovery. No truss.		Ruptured at age of 20.
6/1/91 *	INGUINAL. (H. A. D.)		19	M		Healed by first intention.	30	No truss.	Gone away. Address not known.	

* Performed in private.

Table of Operations for Radical Cure of Hernia (continued).

Date of Admission.	Nature of Hernia.	Date of Operation.	Age.	Sex.	Reducible or Irreducible.	Subsequent Progress.	Duration of Treatment in Hospital.	Result on Discharge.	Date when last Seen or Heard from. Condition then, and Period Elapsed since Operation.	Remarks.
							days.			
9/1/91	Inguinal (R.) Epiplocele.	11/1/91	54	M	Irreducible.	Wound suppurated. Was opened, scraped and plugged with with CHI_3 and allowed to granulate up.	53		Gone away.	Length of time in hospital considerable, owing to suppuration.
28/1/91	Inguinal (R.) Congenital.	11/2/91	29	M	Reducible.	Healed by first intention.	28	Good. No protrusion. Light truss.	Not known at address written to.	Two separate sacs one behind the other ligatured and removed.
11/3/91	Inguinal (L.) Epiplocele.	25/3/91	18	M	Reducible.	Healed by first intention.	33	No protrusion. Wore truss.	Seen Sept. 1/93. No return of rupture. 2 years 6 months. Wears truss since operation.	
11/3/91	Inguinal (R.)	18/3/91	18	F	Reducible.	Healed by first intention.	25	Quite firm scar. No truss.	Aug. 28/93. No return of rupture, 2 years 5 months, discomfort during pregnancy, since then has felt nothing of rupture. No truss.	No gut or omentum seen during operation. Hernia did not pass beyond external abdominal ring.
18/3/91	Inguinal (R.) Congenital.	8/4/91	7	M	Reducible.	Healed by first intention.	21	Completely recovered.	Seen Aug. 25/93. No return of rupture. 2 years 4½ months. No truss since operation. Scar thick and hard. Left testicle undescended.	Sac empty. Upper part ligatured. Lower part left to form tunica vaginalis.

26/3/91	INGUINAL (R.)	8/4/91	25	F	Reducible.	Healed by first intention.	25	Went out with pad and bandage.		The hernia was seen and felt by Mr. Tyrrell and the H. S., but at operation sac small and empty. Ligatured and removed.
* 20/4/91	INGUINAL (R.) (Captain R. E.)		38	M	Reducible.	Healed by first intention.	54	Truss.	Oct. 4/93. No return of rupture. 2 years 5 months. Wore truss since operation, until last 2 months.	Large scrotal hernia. Large amount of omentum removed.
10/6/91	INGUINAL (L.)	17/6/91	23	M	Reducible.	Healed by first intention.	16	No protrusion. No truss.	Heard by letter. } Aug. 30/93. Rupture returned. 2 years 2½ months. Wears a truss now.	
30/9/91	INGUINAL (L.) Entero-Epiplocele	20/10/91	18	M	Reducible.	Healed by first intention.	21	Scar firm.	Address unknown.	
1/10/91	DOUBLE INGUINAL.	Left 23/10/91 Right 18/11/91	25	M	Reducible.	Both healed by first intention.	62	Scars firm. No undue impulse on coughing.	Address unknown.	Alcoholic subject.
26/10/91	INGUINAL (R.) Congenital. Funicular.	10/11/91	2	M	Reducible.	Death. 3 days after operation.				Sac, shut off below from testicle, divided horizontally, and separated from elements of cord. Neck ligatured. No symptoms of anything wrong with wound. Abdomen normal. Breathing bad. Pneumonia. P.M.—One small patch broncho-pneumonia, right lower lobe. No peritonitis.
16/11/91	INGUINAL (R.)	26/11/91	19	M	Reducible.	Healed by first intention. Developed pneumonia day after operation, lasting 7 days.	31	Went out quite healed. No truss.	Heard Aug. 24/93. No return of rupture. 1 year 9 months. Wears no truss. Wound well.	

* Performed in private.

Table of Operations for Radical Cure of Hernia (continued).

Date of Admission.	Nature of Hernia.	Date of Operation.	Age.	Sex.	Reducible or Irreducible.	Subsequent Progress.	Duration of Treatment in Hospital.	Result on Discharge.	Date when last Seen or Heard from, Condition then, and Period Elapsed since Operation.	Remarks.
19/11/91	Inguinal (L.)	24/11/91	19	M	Reducible.	Healed by first intention.	27	Site of operation firm and thickened. No undue impulse. No truss.	Heard from father, son in Canada. } Aug. 26/93. No return of rupture. 1 year 9½ months. Wears a truss now. Wound is all right.	
24/11/91	Inguinal (R.) Epiplocele.	1/12/91	59	M	Irreducible.	Healed by first intention except at insertion of drainage tube.	18	Went out with truss.	Aug. 30/93. No return of rupture. 1 year 10 months. No truss now. Wore one for 1 year after operation.	Sac thick. Mass of adherent omentum removed. Drainage tube inserted.
7/12/91	Double Inguinal. Congenital. Enterocele.	Left 9/12/91 Right 6/1/92	2 10/12	M	Reducible.	Both sides healed without suppuration.	51	Good. Considerable thickening over both inguinal canals. No impulse on coughing. No truss.	Heard by letter. } Aug. 25/93. No return of rupture. 1 year 8 months. "Is quite well." "Has gone to a home in Canada."	On both sides a new tunica vaginalis made. Sutured with silk.
*28/12/91	Inguinal. (R. C.)		39	M		Healed by first intention.	14	No truss.	Sept. 28/93. No return of rupture. 1 year 9 months. Truss on other side.	Acquired. Large quantity of omentum removed.
11/1/92	Inguinal (L.) Entero-epiplocele.	20/1/92	46	M	Irreducible. Omentum adherent.	Healed by first intention.	24	Good. No impulse on coughing. External ring firmly closed. No truss.	Heard by letter. } Aug. 29/93. No return of rupture. 1 year 7 months. Has not worn truss since operation. Wound is quite well.	Omentum ligatured and removed; sac ditto. Pillars of ring sutured with 4 Lembert's sutures (silk).

23/1/92	INGUINAL (R.)	3/2/92	23	M	Reducible.	Stitches taken out on fifth day, wound not quite healed, edges of wound having overlapped.	13	No truss.	No answer to letter.	No sac found. Pillars sutured with silk.
23/2/92	INGUINAL (L.) Epiplocele.	26/2/92	33	M	Irreducible.	Healed by first intention.	17	No truss. No bulging or pain on coughing.	Seen Aug. 29/93. No return of rupture. 18 months. Wears a truss now, not because it is necessary, but be has a right inguinal hernia and an old double truss which be makes use of.	Omentum removed, sac ligatured, and ring sewn with silk. Double hernia. Right not operated on.
17/3/92	INGUINAL (L.)	10/4/92	20	M		Healed by first intention.	10			
4/5/92	INGUINAL (L.) Epiplocele.	10/5/92	19	M	Reducible.	Healed by first intention.	19	No truss.	Heard by letter. } Aug. 25/93. No return of rupture. 1 year 3 months 12 days. Never worn a truss since operation. "Never any pain nor a day's illness since operation."	Omentum and sac ligatured and removed.
4/5/92	INGUINAL (R.) Funicular.	13/5/92	19	M	Reducible.	Localised suppuration in wound. Pus let out.	30	No truss.	Heard by letter. } Aug. 23/93. No return of rupture. 15 months 9 days. Wound well. No truss since operation.	Sac long and narrow. Empty at operation. Sac adherent to cord. Sac removed.
*25/6/92	INGUINAL. (R.C.W.)		20	M	Reducible.	Healed by first intention.	32	No truss.	Sept. 29/93. No return of rupture. 1 year 3 months. Light truss for riding.	

* Performed in private.

Table of Operations for Radical Cure of Hernia (continued).

Date of Admission.	Nature of Hernia.	Date of Operation.	Age.	Sex.	Reducible or Irreducible.	Subsequent Progress.	Duration of Treatment in Hospital.	Result on Discharge.	Date when last Seen or Heard from. Condition then, and Period Elapsed since Operation.	Remarks.
							DAYS.			
28/6/92	Inguinal (R.)	6/7/92	18	M	Reducible.	Wound healed by first intention, except for suppuration in suture holes.	19	Good.	No answer received.	Sac empty at operation, removed and ligatured. Ring and canal sutured with strong catgut.
29/6/92	Inguinal (R.) Congenital. Epiplocele.	2/7/92 Varicocele 28/7/92	25	M	Irreducible.	Healed by first intention. Slight swelling at lower end of wound, containing dark blood. Incised.	42 Owing to subsequent operation for varicocele.	No truss.	Heard by letter. } Sept. 26/93. No return of rupture. 1 year 2 months. No truss since operation. Wound well.	Right testicle atrophied, and in inguinal canal near external ring. Behind and adherent to it was an omental hernia. Testicle removed. Also a left varicocele, treated subsequently.
1/10/92	Inguinal (R.) Epiplocele.	5/10/92	28	M	Reducible.	Healed by first intention.	32	No impulse. No truss.	Has left his old address.	
27/10/92	Inguinal (R.) Enterocele.	2/11/92	18	M	Reducible.	Granulation; owing to an absorbent sponge being left in at operation.	32	Scar large, but firm.	Seen Aug. 28/93. No return of rupture. 10 months. No undue impulse. Scar firm, scab in one spot. No truss.	Applicant for army. External wound healed over. An absorbent wool sponge left in accidentally at operation. After removal (8 days after operation), wound was plugged and allowed to granulate.
21/11/92	Inguinal (R.) Epiplocele.	2/12/92	55	M	Irreducible.	Suppurated. Resulting sinus—opened.	32		Seen Sept. 1/93. No return of rupture. 9 months. No truss since operation.	Unhealthy subject. Hernia size of a pigeon's egg. Omentum adherent to sac. Tissues unhealthy. Suppuration and rise of temperature.
29/11/92	Inguinal (R.) Infantile. Epiplocele.	7/12/92	10	M	Reducible.	Healed by first intention.	25		Heard Sept. 2/93. No return of rupture. 9 months. No truss since operation. Wound perfectly well	Hernia reached to bottom of scrotum. Silk sutures.

*14/12/92	INGUINAL. (B.R.G.)		18	M	Reducible.	Healed by first intention.	34		Sept. 29/93. No return of rupture. 9 months. Very light truss worn.	
16/1/93	INGUINAL (L.) Epiplocele.	18/1/93	10	M	Reducible.	Healed by first intention.	25	Went out with truss.	Seen Sept. 1/93. No return of rupture. 8 months. No truss now. Wore one for 2 weeks after operation.	Omentum in sac ligatured in two places and removed. Silk sutures to pillars.
30/1/93	INGUINAL (L.) Enterocele.	3/2/93	56	M		Healed by first intention.	22		Seen Aug. 30/93. No return of rupture. 7 months. No impulse. Worn a truss since operation because of occupation, and is afraid to leave it off.	Sac ligatured and removed. Canal sewn with 6 silk sutures.
30/1/93	INGUINAL (L.) Bubonocele.	1/2/93	18	M	Reducible.	Healed by first intention.	26		Address unknown.	Previous operation for varicocele on this side. Subsequent development of hernia. Whole of weak part of external oblique aponeurosis tightened by a pucker in line of inguinal canal with Lembert's sutures.
13/2/93	(DOUBLE)INGUINAL (R.) Entero-Epiplocele.	Right 22/2/93	21	M	Reducible.	Healed by first intention.	21		Not known at old address.	Sac ligatured and removed. 6 silk sutures: 3 in aponeurosis and 3 between pillars.
13/2/93	INGUINAL (R.) Epiplocele.	15/2/93	24	M	Reducible.	Healed by first intention.	23	No truss.	Heard Sept. 3/93. No return of rupture. 7 months. No truss. Is in army.	Omentum and sac ligatured and removed. Pillars sewn with 6 silk sutures. Retention.
3/3/93	INGUINAL (R.)	10/3/93	23	M	Reducible.	Healed by first intention.	23		Not known at address written to.	Sac empty at operation.
6/3/93	DOUBLE INGUINAL.	Left 8/3/93 Right 24/3/93	22	M	Both reducible.	Both healed by first intention.	43	No truss.	Sept. 5/93. No return of rupture. 6 months. No truss since operation.	Left sac empty. Right contained a loop of gut.

* Performed in private.

Table of Operations for Radical Cure of Hernia (continued).

Date of Admission.	Nature of Hernia.	Date of Operation.	Age.	Sex.	Reducible or Irreducible.	Subsequent Progress.	Duration of Treatment in Hospital.	Result on Discharge.	Date when last Seen or Heard from. Condition then, and Periods Elaped since Operation.	Remarks.
							days.			
13/3/93	Inguinal (R.) Epiplocele.	15/3/93	27	M	Reducible.	Healed by first intention.	20		Sept. 2/93. No return of rupture. 6 months. No truss since operation.	Omentum adherent. Ligatured and removed.
3/5/93	Inguinal (L.)	9/5/93	35	M	Reducible.	Healed by first intention.	22	No truss.	Sept. 1/93. No return of rupture. 4 months. No truss since operation.	Sac empty at operation. Transfixed, ligatured, and removed.
21/5/93	Inguinal (R.) Epiplocele.	25/5/93	30	M	Irreducible. Omentum adherent to sac.	Suppuration in wound. Small superficial abscess formed 5 days after operation. Was incised. Separation of small slough from scrotum 22 days after operation. The wound looked healthy except that the opening in scrotum had not closed perceptibly; 25 days after operation swelling of abdomen noticed. Incised next day to the left of middleline and above umbilicus. 32 days after operation wound in abdomen healed, and that in scrotum nearly healed.			No address.	Doughy hernia. Size of hen's-egg. Only partially reducible. 5 Lembert's sutures used for pillars.

14/6/93	Inguinal (R.)	20/6/93	21	F	Reducible.	Healed by first intention.	28	No truss.	Oct. 24/93. No return of rupture. 4 months. No truss.	Ruptured 15 years. Sac empty at operation. Ring large, 4 silk sutures. Left ring also sutured, being weak and large.
19/6/93	Inguinal (R.)	21/6/93	14	F	Reducible.	Healed by first intention.	23	No truss.	Oct. 24/93. No return of rupture. 4 months. No truss.	Small empty sac. Not closely connected with round ligament. 4 silk sutures to ring.
13/7/93	Inguinal (R.) Epiplocele.	18/7/93	54	M	Partially irreducible.	Suppurated.	34	No truss.	Oct. 20/93. No return of rupture. 3 months. No truss.	Large amount of omentum removed. Sac ligatured and removed. 2 silk sutures.
20/7/93	Inguinal (R.)	26/7/93	18	M	Irreducible.	Suppurated.	29	No truss.	Oct. 21/93. No return of rupture. 4 months. No truss.	Sac empty. 5 sutures.
28/7/93	Inguinal (L.) Congenital.	3/8/93	20	M	Reducible.	Healed by first intention.	19	No truss.	Oct. 16. No return of rupture. 3 months. No truss.	Sac empty at operation. Left testicle undeveloped and partially descended, removed.
*	Inguinal (L.)	13/10/93	15	M		Healed by first intention.				Sac empty at operation. 5 silk sutures.
*4/5/82	Femoral (R.) (J.R).	4/5/82	35	M		Healed by first intention.		No truss.	Good result.	Small hernia. Sac tied and removed.
* 5/5/90	Femoral (L.) (H.T.H.)		16	M	Reducible.	Healed by first intention.	20	No truss.	Oct. 10/93. No return of rupture. 3 years 5 months. No truss.	Omentum excised.
1/6/90	Femoral (R.) Epiplocele.	15/6/90	31	F	Irreducible. Omentum adherent.	Healed by first intention.	25	No impulse nor tenderness.	Heard. Aug. 29/93. No return of rupture. 3 years 2 months. No truss. 1 child 11 months after; no inconvenience.	There was inflammation of glands of groin, from pressure of truss, on admission. Fascia sutured with 3 silk sutures.
26/5/91	Femoral (L.) Recurrent.	1/7/91	57	F	Reducible.	Superficial suppuration with resulting sinus.	47	Went out with light truss.	Seen. Sept. 1/93. No return of rupture. 2 years 2 months. Wears a truss now. Wound well, except chronic sinus.	On admission, had suffered from hernia 27 years, and been operated on by Mr. S. Jones 4 years ago. 3 years ago lump reappeared under truss. 1½ years ago skin ruptured and intestines escaped; they were replaced at Lambeth Infirmary, ever since which there has remained a lump with sinus and eczematous condition of skin. Sac large, thin and adherent, so it was divided across upper part, ligatured, and part cut away; main part left. Contained large amount of small intestines.

* Performed in private.

Table of Operations for Radical Cure of Hernia (continued).

Date of Admission.	Nature of Hernia.	Date of Operation.	Age.	Sex.	Reducible or Irreducible	Subsequent Progress.	Duration of Treatment in Hospital.	Result on Discharge.	Date when last Seen or Heard from. Condition then, and Period Elapsed since Operation.	Remarks.
							DAYS.			
20/6/92	Femoral (L.)	22/6/92	37	F	Reducible.	Lower half of wound healed slowly, with tendency to suppuration. Upper part quite healed on fifth day. Was walking about on eighteenth day.	28	Wound healed, cicatrix strong. Went out wearing truss.	Seen. Aug. 30/93. No return of rupture. 1 year 3 months. Wears a truss and has done so since operation.	Small empty sac. Large amount of sub-peritoneal fat. Sac opened, ligatured and removed. Fascia sewn with 2 silk sutures.
22/6/92	Femoral (R.)	22/6/92	39	F	Irreducible.	Healed by first intention.	30	Good.	Gone away.	Double sac. The first quite shut off from peritoneum; the second opening into it by a narrow neck. Fascia sewn with 3 silk sutures.
27/7/89	Umbilical. Epiplocele.	5/8/91	39	M	Irreducible. Omentum adherent.	Healed by first intention.	19	Went out with belt.	Sept. 4/93. No return of rupture. 4 years 1 month. No truss. Wore one for first year after operation. Wound well.	Omentum separated with much difficulty from sac. Ligatured in 3 places and cut off. Ring sutured with 3 sutures.
31/12/89	Umbilical. Epiplocele.	3/1/90	63	F	Irreducible.	Healed by first intention.	15	Good.		Skin very thin. 2 sacs. Opening in abdominal aponeurosis sutured with 1 kangaroo tendon and 2 thick gut sutures.

24/10/92	Umbilical Epiplocele.	26/10/92	50	F	Irreducible.	Progress good, till sudden death.		Death day after operation from cerebral embolism.		Sac contained much adherent and thickened omentum. No gut. Sac removed with some skin. 5 silk sutures through peritoneum and margin of opening. Diameter of hernia 6½". Circumference 13". Projecting 2". P.M.—Cerebral embolism. Embolus in right middle cerebral artery. Area supplied by it softened. Central part of hemisphere hyperæmic. Vegetations on aortic valve. Everything in abdomen healthy.
*	Ventral. (Miss L.)	16/5/92		F	Reducible.	Good.			Oct. /93. Quite well.	Hernia size of half a cocoa-nut. After ovariotomy, coming through an aperture 6 inches in length between the recti muscles. Caused by yielding of cicatrix. Very large protrusion.

* Performed in private.

No return of the Rupture in the following 49 Cases which have been traced.

Inguinal.

Interval Elapsed Since Operation.	Number.
5 to 6 years.	2
4 ,, 5 ,,	3
3 ,, 4 ,,	7
2 ,, 3 ,,	5
1 ,, 2 ,,	11
10 months.	1
9 ,,	3
8 ,,	1
7 ,,	2
6 ,,	2
4 ,,	4
3 ,,	2

Femoral.	
Interval Elapsed Since Operation.	Number.
3 to 4 years.	2
2 ,, 3 ,,	1
1 ,, 2 ,,	1
Umbilical.	
4 years.	1
Ventral.	
1½ years.	1

SUMMARY.

Analysis of the Results of the Operation for the Radical Cure of Ninety Cases of Non-Strangulated Hernia.

By Sir William Mac Cormac.

	Number of Cases Operated Upon.	Noted as having Healed by First Intention.	Cases which Suppurated.	Average Duration in Hospital after Operation.	Cases Known to have Worn no Truss since the Operation.	Wearing a Truss now.	Relapses.	Deaths.
Inguinal.	80	56 (80 %)	14 (20 %)	32 days.	39	7	4	1 from acute broncho-pneumonia in a child of 2 years, 3 days after the operation.
Femoral.	6	5 (83 %)	1 (17 %)	32·5 days.	2	2	—	—
Umbilical.	3; and 1 ventral.	2	—	17 days.	—	—	—	1 from cerebral embolism due to detachment of vegetations on the aortic valve, in a woman of 50, 36 hours after the operation.

	Inguinal.	Femoral.
Operations for the Radical Cure of Non-Strangulated cases of Hernia, performed by other Surgeons of the Hospital . . .	123	17
Fatal	9 (7·32 %)	0

TABLE VII.

Cases of Strangulated Hernia in which an Operation for the Radical Cure was also performed.

	Inguinal.	Femoral.	Umbilical.
Number.	27	14	3
Deaths.	7 (25·8%)	1 (7·1%)	1 (33·3%)
Relapses.	—	—	—
Wearing trusses now.	—	2	1
No truss since operation.	9	4	—
Average duration in hospital after operation.	30·8 days.	23·4 days.	26 days.
Healed by first intention.	13 (65%)	10 (90·9%)	—
Suppurated.	7 (35%)	1(9·1%)	1

TABLE VIII.

Operations for Strangulated Hernia in which no Radical Operation was performed.

	Inguinal.		Femoral.		Umbilical.	
Recovery.	23	62%	34	64·2%	2	25%
Death.	14	38%	19	35·8%	6	75%
			In one, 3in. of gut resected.		In one excision of whole of transverse colon? Cause of death. No peritonitis.	

Other Surgeons' Operations for Strangulated Hernia, including a certain number in which Radical Cure was also performed.

	Inguinal.	Femoral.
	171	216
Fatal	56 (32·75%)	74 (34·26%)

TABLE IX.

Table of Mortality and Proportion of Relapses in 2500 Cases of the Radical Cure of Non-Strangulated Hernia.

	Number of Cases.	Mortality.	Recurrence.	Method of Operating.
Barker.	50 { Inguinal 45. Femoral 2. Umbilical 3.	0	8 { Inguinal 6 / Umbilical 2 } = 21% (38 cases only traced.)	Barker's method 21. Macewen's „ 1. Banks' „ 21.
Ball.	22 Inguinal.	0	3 = 13·6%	Ball's method in all.
Macewen.	52 { Inguinal 49. Femoral 3.	0	1 Inguinal = 1·9%	Macewen's method in all.
Mac Burney.	36 Inguinal.	1 = 2·7%	1 = 2·7%	Mac Burney's method in all.
Poore.	25 Inguinal. (All children.)	0	0	Mac Burney's method in 20. Macewen's „ „ 1. Banks' „ „ 3. Sac fixed in inguinal canal in 1.
Kocher.	119	1 = 0·84%	19·2% (94 cases only traced.)	Kocher's method in all.
Bull.	118 { Inguinal 105. Femoral 10. Ventral 3.	2 Inguinal = 1·6% Both from hæmorrhage within twenty-four hours from slipping of omental ligatures.	2·3%	Different methods, ligature and removal of sac in 32. „ „ „ „ with suture of external ring in 36. „ „ „ „ with suture of canal in 34. 16 cases were in children and the operations were varied. In 4 no sac was found and in several the ring only was closed.
Escher.	23 Inguinal.	1 = 4·3%	3 = 14%	Bassini's operation in all.
Billroth.	51 { Inguinal 43. Femoral 6. Umbilical 2.	2 Femoral = 3·9%	4 { Inguinal 2 / Femoral 2 } 7·8%	Sac removed, and ring sutured, in femoral. Sac removed, pillars sewn together, in inguinal. Sac removed, peritoneum sutured and fascia sutured, in umbilical.
Championnière.	275 { Inguinal 238. Femoral 19. Ventral 6. Umbilical 12.	2 { Inguinal 2 / Femoral 0 / Ventral 0 / Umbilical 0 } = 0·8%	14 = 12% (112 cases traced.)	In inguinal: Ligature and removal of sac and contained omentum. Deep sutures to canal. In femoral: Ligature and removal of sac, deep sutures to ring. In umbilical: Chain sutures to neck of sac, and removal of sac and omentum, and fascia sutured; deep and superficial sutures alternately to parietes. By letter, 376 cases with 2 deaths. 120 in succession without a death.

Parker of Buffalo.	86 { Inguinal 75. Femoral 3. Umbilical 8.	0	No mention.	Neck ligatured and sac removed. Closure of inguinal canal and ring.
Banks.	117 { Inguinal 84. Femoral 25. Ventral 4. Umbilical 4.	7 { Inguinal 6 Femoral 1 Ventral 0 Umbilical 0 } = 5·9%	17 { Ing. 10 Fem. 3 Vent. 3 Umb. 1 } = 14·5%	
J. Wood.	339 Inguinal.	7 = 2·06%	59 = 14·4%	Subcutaneous wire-suturing.
W. Thornley Stoker. (*B.M.J.*, vol. ii. p. 1201, 1887.)	3 Inguinal.	0	1 weak, wore truss.	Sac ligatured, and part removed if large. Torsion of sac. 2 silk sutures through pillars, transfixing sac, brought through skin and tied button-fashion on a leaden plate.
Kendal Franks. (*B.M.J., ibid.*, p. 1202.)	20	No mention.	4 = 20%	Silver wire passed through pillars, transfixing sac. Sac excised below sutures. Sac twisted twice. Silver sutures to canal, and buried sutures to superficial structures.
Mayo Robson. (*B.M.J.*, 1887, vol. ii.)	11 { Inguinal 8. Femoral 1. Umbilical 2.	1 Inguinal = 9·1%	2 Inguinal = 18·2%	Inguinal: 2 by Wood's method. In 3, sac ligatured and removed and canal sutured. In 3, sac ligatured and removed. Femoral: Sac ligatured and removed. Umbilical: Sac ligatured and removed. Wire sutures to pillars.
Marcy.	79 { Inguinal 55. Femoral 12. Umbilical 9. Ventral 3.	No mention.	4 Inguinal = 5·06%	Inguinal: Ligature and excision of sac. Fine tendon sutures to canal. Femoral: Double continuous suture to ring. Fine sutures to, and excision of sac.
Socin.	75 { Inguinal 65. Femoral 10.	2 = 2·6%	Not mentioned.	Simple ligature to sac. Suture of pillars when necessary (only rarely in inguinal hernia). Suture of aponeurosis.
Thirier of Brussels.	14	1 = 7·5%	2 = 15%	Operated on by Championnière's method.
Neve.	55	2 = 2·6%	7 = 12·7%	Spanton's operation in 48; ligature and excision of sac in 7.
Halstead.	74 { Inguinal 73. Femoral 1.	None.	9 = 12·1%	5 operated on by Mac Burney's method, two of which recurred, 58 by Halstead's operation, in which make new canal and new ring. Sac opened, sutured, and cut away. 6 to 8 deep mattrass sutures passing through aponeurosis of external oblique, internal oblique and transversalis on one side, and through transversalis, Poupart's ligament, and fibres of aponeurosis of external oblique on other. Skin brought together with fine silk sutures.
Mac Cormac.	85 cases (90 operations.)	2 = 2·3%	55 cases traced. 4 relapsed = 7·2%	

Table of Mortality of, and Proportion of Relapses in, 2500 Cases of the Radical Cure of Non-Strangulated Hernia.

	Number of Cases.	Mortality.	Recurrence.	Method of Operating.
Bassini.	251	1 = 0·39% The death occurred from pneumonia on the 10th day. The wound had followed an aseptic course.	7 out of 247 = 2·8%	Bassini's method. 1. Incision over inguinal canal. Tendon of external oblique incised over a director (passed into external abdominal ring, superficial to hernial sac and cord structures), and internal ring exposed. Upper flap freed until conjoined tendon is exposed. Lower flap dissected until Poupart's ligament is well exposed. Hook up cord and structures and hernia out of their bed as far as internal ring. Isolate hernial sac without reducing contents, by dividing overlying structures on director, open sac. Adhesions and omentum tied with fine catgut. Divide any constriction at internal ring. Transfix and ligature sac. Excise sac. 2. Conjoined tendon on upper side united to Poupart's ligament by interrupted suture of chromic gut or kangaroo tendon. (4–6). 3. Suture the divided external oblique tendon with fine catgut continuously for whole length. Skin wound closed with interrupted catgut sutures. Drainage tube.
Wolf.	33 { Inguinal 26. Femoral 7.	2 = 6·06%	7 = 21·2%	Ligature and excision of sac with suture of ring. 3 suppurated.
Lockwood.	45 { Inguinal 33. Femoral 12.	1 femoral = 2·2%	2 recurred in 7 cases traced.	Inguinal: In 17, ordinary operation, *i.e.*, without opening the inguinal canal. In 16, Bassini's operation. Femoral: Sac opened. Transfixed and ligatured with a Staffordshire knot. Neck of sac drawn up into abdomen and fixed. Femoral canal closed by fastening together Hey's and Cooper's ligaments, with one or two silk sutures.
Berger.	128	1 = 0·71%	2 = 1·42%	Modification of Bassini's operation.
Schede.	72	0	7 = 10%	Silver sutures.
Leisrink.	202	15 = 7·4%	No mention.	
Küster	40	0	9%	Küster's method.

Average mortality: 2·01 % in 2401 cases traced. Average proportion of relapses: 10·8 % in 1842 cases traced.

The percentage of recurrence is calculated on 67 strangulated and non-strangulated cases.